

**Supplemental
Notice of Allowability**

Application No.

10/568,942

Examiner

MICHAEL R. NEFF

Applicant(s)

HELARD ET AL.

Art Unit

2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to interview conducted 1/28/2010.
2. ☒ The allowed claim(s) is/are 1 and 3-18.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some* c) ☐ None of the:
- ☒ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
- * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date <u>2/4/2010</u> . |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

/MICHAEL R. NEFF/
Examiner, Art Unit 2611

SUPPLEMENTAL DETAILED ACTION

EXAMINER'S AMENDMENT

1. An Examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to the applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this Examiner's amendment was given in a telephonic interview with David D. Brush on 1/28/2010; the amendments made hereafter were discussed in detail, but due to the time zone difference the representative could not confirm total agreement with the proposed amendments. As provided above changes can still be made to the claim language, and the Examiner has invited the representative to contact him to discuss any further changes the applicant or applicant's representatives deem necessary for the claim language.

The following is a Supplemental Examiner's Amendment; please replace the previous amendments with those presented below:

Replace claim 1 with the following:

1. A method for the decoding of a received signal comprising symbols distributed in at least one of space, time or frequency by a space-time or space-frequency encoding matrix, wherein the method implements the following steps:

a space-time decoding, which is the inverse of a space-time encoding implemented at emission, delivering a decoded signal;

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an equalization of said decoded signal, delivering an equalized signal;

a first estimation of the symbols forming the received signal, delivering an estimated signal, wherein said first estimation comprises the following steps:

diagonalization, by multiplication of the equalized signal by a diagonalization matrix, leading to a diagonal total encoding/channel/decoding matrix taking account of at least said encoding matrix, and of a decoding matrix that is the conjugate transpose of said encoding matrix;

first diversity pre-decoding, which is the inverse of a diversity pre-encoding implemented at emission of said signal, fed by the diagonalization step and delivering first pre-decoded data;

estimation of the symbols forming said received signal, from said first pre-decoded data, delivering the estimated symbols;

diversity pre-encoding, identical to said first diversity pre-encoding implemented at emission, applied to said estimated symbols, to give the estimated signal;

and at least one iteration of an interference cancellation step, each iteration comprising the following sub-steps:

subtraction, from said equalized signal, of said estimated signal multiplied by an interference matrix, delivering an optimized signal;

second diversity pre-decoding of said optimized signal, which is the inverse of the diversity pre-encoding implemented at emission, delivering second pre-decoded data;

estimation of the symbols forming said optimized signal, from said second pre-decoded data, delivering new estimated symbols; and

diversity pre-encoding: identical to said diversity pre-encoding implemented at emission, applied to said new estimated symbols, to give a new estimated signal, except for the last iteration.

Replace claim 17 with the following:

17. A receiver for receiving a received signal, comprising symbols distributed in at least one of space, time, or frequency by a space-time encoding matrix, wherein the receiver comprises:

means of space-time decoding that is the inverse of a space-time encoding implemented at emission, delivering a decoded signal;

means of equalization of said decoded signal, delivering an equalized signal;

first estimation means for the estimation of the symbols forming the received signal, delivering an estimated signal;

wherein said first estimation means comprises:

means of diagonalization, by multiplying the equalized signal by a diagonalization matrix leading to a diagonal total encoding/channel/decoding matrix taking account of at least said encoding matrix and of a decoding matrix that is the conjugate transpose of said encoding matrix;

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means of first diversity pre-decoding, performing a first pre-decoding which is the inverse of a diversity pre-encoding implemented at emission of said signal, fed by the diagonalization step and delivering first pre-decoded data;

first estimation means for the estimation of the symbols forming said received signal, from said first pre-decoded data delivering the estimated symbols;

means of first diversity pre-encoding, performing a pre-encoding which is identical to said diversity pre-encoding implemented at emission, applied to said estimated symbols, to give the estimated signal;

means for subtraction, from said equalized signal, of said estimated signal multiplied by an interference matrix, delivering an optimized signal;

means of second diversity pre-decoding of said optimized signal, performing a second pre-decoding which is the inverse of the diversity pre-encoding implemented at emission, delivering second pre-decoded data;

second estimation means for the estimation of the symbols forming said optimized signal, from the second pre-decoded data, delivering new estimated symbols; and

means of second diversity pre-encoding, performing a pre-encoding identical to said diversity pre-encoding implemented at emission, applied to said new estimated symbols, to give a new estimated signal, except for a last iteration,

each symbol being processed by said means at least once.

Allowable Subject Matter

2. Claims 1, 3-18 are allowed; claim 2 has been cancelled per the applicant's amendments to the claims.

3. The following is an examiner's statement of reasons for allowance: The prior art or record fails to anticipate or render obvious through combination the claims limitations of the specific design structure of the estimation and further interference cancelling steps of the claimed limitations.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL R. NEFF whose telephone number is (571)270-1848. The examiner can normally be reached on Monday - Friday 8:00am - 4:30pm EST ALT Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on (571)272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MICHAEL R. NEFF/
Examiner, Art Unit 2611
/Shuwang Liu/
Supervisory Patent Examiner, Art Unit 2611